

Wong, P. J. Y.; Agarwal, R. P.

On the existence of positive solutions of higher order difference equations. (English)

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Topol. Methods Nonlinear Anal. 10, No. 2, 339-351 (1997).

The authors consider the n -th order difference equation

$$\Delta^n y + Q(k, y, \Delta y, \dots, \Delta^{n-2} y) = P(k, y, \Delta y, \dots, \Delta^{n-1} y), \quad k \in [0, N]$$

satisfying the boundary conditions

$$\Delta^i y(0) = 0, \quad 0 \leq i \leq n-3;$$

$$\alpha \Delta^{n-2} y(0) - \beta \Delta^{n-1} y(0) = 0; \quad \gamma \Delta^{n-2} y(N+1) + \delta \Delta^{n-1} y(N+1) = 0;$$

where $n \geq 2$, $N (\geq n-1)$ is a fixed positive integer, α, β, γ and δ are constants satisfying

$$\rho = \alpha\gamma(N+1) + \alpha\delta + \beta\gamma > 0; \quad \alpha > 0, \quad \gamma > 0, \quad \beta \geq 0, \quad \delta \geq \gamma.$$

They state a fixed point theorem due to Krasnoselskij and present some properties of a certain Green function used for providing an appropriate Banach space and a cone so that the fixed point theorem may be applied to yield a positive solution of the difference equation.

Reviewer: S.Balint (Timișoara)

MSC:

39A10 Additive difference equations

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higher order difference equations; fixed point theorem; Green function; positive solution

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